

## Research Note

### Preliminary study on the effectiveness of mosquito repelling lamp, E Da

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**Abstract.** Photon (light) technology has already been widely used in make-up, medical treatment etc, but repelling mosquitoes by photon technology is an innovation. The objective of this study was to determine the efficacy of a mosquito repelling lamp, E Da under indoor conditions. E Da lamp is a lamp coated with yellow luminous pigment on the inner part of the glass bulb of the lamp which is used to screen out the UV radiation, and when it is turned on, the yellow illuminating wavelength will drive the mosquitoes away. The tests were conducted inside 2 cabins measuring 8' X 8' X 20'. The mosquito population was estimated by using the Bare Leg Catch (BLC) techniques. For treated test, E Da lamp was placed indoor 2 – 3 meters away from a human bait. Another cabin without the lamp was used as untreated control. BLC was conducted in both sites simultaneously. The mosquitoes collected in this study were solely those of *Culex quinquefasciatus* and *Aedes albopictus*. There was an 91.34% reduction of *Cx. quinquefasciatus* population in the treated test compared with the untreated cabin during the 4 hours catches ( $p < 0.05$ ). E Da mosquito repelling lamp used in this study exerted repellency effect against the mosquitoes especially *Cx. quinquefasciatus*.

Various substance and methods of application have been used since ancient times to repel blood-sucking insects. The first methods man used to repel insects was with smoke, covering the skin with mud, or by applying a variety of animal fats and greases (Novak & Gerberg, 2005). Smoke from an open fire repels insects, especially in still air or poorly ventilated dwelling. The repellent effect of smoke may be increased by burning certain materials such as aromatic wood containing resins or various types of plant. In southern India, leaves of *Vitex negundo* are burned to repel mosquitoes from houses (Curtis *et al.*, 1989).

The oils of some plants, such as citronella, are repellent when applied directly to the skin or clothing but their protective effect is very brief. It has

sometimes been prolonged by mixing the volatile repellent with animal fat or oil to reduce the rate or evaporation (Rozendaal, 1997).

Many traditional repellents have the disadvantages that (1) they last a very short time, (2) they are unpleasant to use (strong odour and irritating) and (3) they may have unhealthy side effects (e.g. smoke) (Rozendaal, 1997).

Photon (light) technology i.e. utilization of light has already been widely used in make-up, medical treatment etc, but repelling mosquitoes by photon technology is an innovation, which is an environmentally friendly way to repel mosquitoes.

Insect vision is very different from human. Insects are attracted to light in the UV part of the spectrum. In contrast, they

would be uncomfortable in certain wavelength of the spectrum. Based on this theory, the yellow luminous pigment coated on the inner part of the glass bulb of E Da lamp was used to screen out the UV radiation. When turned on, the yellow illuminating wavelength drives mosquitoes away.

Thus the objective of this study was to determine the efficacy of a mosquito repelling lamp, E Da under indoor conditions.

A minimum of 5 units of the device was provided by the company, BioEcotech (M) Sdn Bhd. The tested device is known as E Da non-insecticides and pesticides mosquito repelling lamp (25W) with a wavelength of 580nm.

The trial was conducted in the compound of the Institute for Medical Research (IMR), Kuala Lumpur. The tests were conducted inside 2 cabins measuring 8' X 8' X 20'. The windows of the cabin were kept open throughout the trial period to allow entrance of mosquitoes from outside. The mosquito population was estimated by using the Bare Leg Catch (BLC) techniques. The BLC were conducted from 2000 to 0000 hour daily during the trial.

For the untreated test (without using E Da mosquito repelling lamp), one person sat indoor for 4 hours from 2000 to 0000 hour. The mosquitoes were collected using glass

vials once they landed on the leg and identified in the lab.

For the test, an E Da mosquito repelling lamp was placed 2 – 3 meters away from a human bait (the collector). One person stayed indoor for 4 hours from 2000 to 0000 hour. The mosquitoes were similarly collected and identified. Both BLC for treated and untreated conditions were conducted simultaneously. Tests were conducted on 5 different days.

Paired t-test at a significance level of  $p < 0.05$  was used to determine the significant difference between the treated and untreated trial.

The mosquitoes collected in this study were solely those of *Culex quinquefasciatus* and *Aedes albopictus*. The majority of mosquito collected was those of *Cx. quinquefasciatus*, which accounted for 92.70% and 64.71% of the total collection in untreated and treated cabins, respectively.

The results obtained from this study (Table 1) showed that there was a significant difference of *Cx. quinquefasciatus* population between treated and untreated cabin during the 4 hours catches ( $p < 0.05$ ). There was a 91.34% reduction of *Cx. quinquefasciatus* population in the treated test compared with the untreated cabin, indicating that the E Da mosquito repelling lamp used in this study exerted repellency effect against *Cx. quinquefasciatus*.

Table 1. Number of mosquitoes collected by BLC in the untreated and treated cabins

Date	Number of mosquitoes collected from 2000 - 0000			
	<i>Cx. quinquefasciatus</i>		<i>Ae. albopictus</i>	
	Untreated	Treated	Untreated	Treated
29 August 2006 (Day 1)	19	0	1	0
30 August 2006 (Day 2)	14	2	2	1
31 August 2006 (Day 3)	36	4	2	2
5 September 2006 (Day 4)	25	2	3	2
6 September 2006 (Day 5)	33	3	2	1
Mean number $\pm$ SE	25.40 $\pm$ 4.13 <sup>a</sup>	2.20 $\pm$ 0.66 <sup>a</sup>	2.00 $\pm$ 0.32 <sup>b</sup>	1.20 $\pm$ 0.37 <sup>b</sup>
t-test	p = 0.000		p = 0.141	

<sup>a</sup> = significantly different at  $p < 0.05$

<sup>b</sup> = not significantly different at  $p > 0.05$

However, there was no significant difference of *Ae. albopictus* population between treated and untreated cabin during the 4 hours catches ( $p > 0.05$ ). This may be due to the low population of *Ae. albopictus* obtained from the study site as the catching of mosquito was conducted in the time range of 2000 – 0000. Moreover, Xue & Barnard (1996) reported that the biting rate of *Ae. albopictus* during the diel period was bimodal; attack rates were highest in the morning (0800) and evening (1400 – 2000). In addition, Marques & Gomes (1997) also reported biting activity of *Ae. albopictus* took place during the day with peak at time 0600 – 0700, 1300 – 1400 and the highest between 1600 – 1700. In Malaysia, Chan (2007) showed that the biting rate of *Ae. albopictus* was highest in the morning (0700 – 0900) and evening (1700 – 1900). Oh (2007) from Malaysia also reported that *Ae. albopictus* is a day time feeder, but there was no regular biting peak obtained from her studies.

E Da lamp possesses safe and reliable, is environment friendly and not harmful to human and plants. According to the information in the product's manual, the E Da mosquito repelling lamp reported a repelling rate of more than 80%. However, using other light sources at the same time e.g. TV, screen, LCD, ordinary light will affect the effectiveness as such wavelengths interfere with the repelling wavelength of E Da lamp. It has no smoke, odour, poison, pollution and radiation.

In conclusion, E Da mosquito repelling lamp used in this study may exert repellency effect against mosquitoes especially *Cx. quinquefasciatus*. However, further studies on the E Da mosquito repelling lamp should be carried out under controlled conditions using the standardized repellent-bioassay method to confirm its effectiveness.

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